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CERTIFICATE OF ACCURACY

This is to certify that the attached document, Korean Intellectual Property Office (KR), Patent Publication (B1), Application No.: Patent 1986-0009396, has been translated from Korean into English by staff members of THE LANGUAGE LAB familiar with both the Korean and English languages, and is to the best of our knowledge, ability and belief a true and accurate translation.

For THE LANGUAGE LAB

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(54) Title: STERILIZATION AND PURIFICATION FILTER FOR ION WATER PURIFIER

Summary
(N/A)

Representative drawing: Figure 1

Specification

[Title of the Invention] Sterilization and purification filter for ion water purifier

[Brief Description of the Drawings]

Fig. 1 is a sectional view of a conventional ion water purifier.

Fig. 2 is a sectional view of an ion water purifier containing a filter according to the invention.

Fig. 3(a) is a partially exploded perspective view of the filter of the invention.

Fig. 3(b) is a transversal cross-section of the filter of the invention.

Fig. 4 is an enlarged view of silver-added activated carbon according to the invention.

Figs. 5(a) and 5(b) are respectively a partially exploded perspective view and a sectional view of a filter according to the invention where the filter is mounted in a housing.

Fig. 6 is a graph showing variation in the number of bacteria with the time of electrolysis.

* Reference numerals in the drawings

8: Filter 9: Housing 10: flow passageway

11', 11": Non-woven fabric 12': Silver-added activated carbon

12": Untreated activated carbon

[Detailed Description of the Invention]

The present invention relates to a sterilization and purification filter to be used in an ion water purifier. More specifically, the invention relates to such a filter, in which silver-added activated carbon is pressed into a non-woven fabric, which is contained in a plastic housing with a flow passageway, and thereafter the housing is installed in the cathode chamber of an ion water purifier, thereby removing bacteria, organic materials, and impurities, which remain in the alkaline water produced in the ion water purifier. The ion water purifier is a device, in which alkaline drinking water containing a high concentration of (+) ions such as calcium, potassium and sodium is

generated in the cathode chamber. Also, in the anode chamber, a cosmetic water of acidity featuring a high concentration of (-) ions such as chlorine and sulfur is produced. As shown in Fig. 1, a diaphragm 34 is installed in a container 31, which thereby is divided into a cathode chamber 32 and an anode chamber 33. The two chambers 35 and 36 are filled with electrolyte water, to which the corresponding electrodes 35 and 36 are added and a DC voltage is applied, thereby causing an electrolytic action. The anode employs a ferrite electrode and the cathode employs a stainless steel electrode. The water contained in the chamber is electrolyzed to produce alkaline water and acidic water in the respective chambers.

Here, although it varies with the time of electrolysis, the alkaline water has a pH of 4~5. This alkaline water can be used as beautifying water for skin cosmetics. In other words, the alkaline water can be used for improving one's physical condition, so that the acidic physical condition due to acid foods can be changed into a weak alkaline condition, which would improve health, and antibacterial skin (weak acidic) can be prevented from changing into an alkaline skin, due to aging of skin.

The conventional ion water purifier is configured in such a manner that it exhibits a sterilizing effect in the alkaline or acid pH range, not in the neutral pH range (around pH 7) where bacteria remain alive. However, as shown in the graph of Fig. 6, the acid water is completely sterilized around pH of 4.5, and the alkaline water is not highly sterilized even after the time of electrolytic dissociation. In addition, since tap water or underground water is used and electrolyzed, impurities contained in the tap water or underground water is deposited at the bottom of the container and then discharged together with the purified water. Thus, the impurities and bacteria contained therein are absorbed by the body upon consumption of the purified water.

The present invention provides complete sterilization and purification for an ion water purifier. According to the invention, a certain amount of water-soluble silver salt is adsorbed between upper and lower non-woven fabrics which feature a good air-permeability. Then, silver-added activated carbon, which is produced by reacting

with chloride salts having the same equivalent, and a non-treated activated carbon are alternately loaded to form a filter, which is then held in a housing with a flow passageway, which enables the filtering and sterilizing of alkaline water. The present invention will be described in detail, with reference to the accompanying drawings.

Fig. 2 is a sectional view of an ion water purifier equipped with a filter according to the invention. The ion water purifier includes a container 1, in the middle of which a diaphragm 4 featuring a multitude of holes forms a cathode chamber 2 for producing alkaline water having (+) ions and an anode chamber 3 for producing acidic water having (-) ions. The lower end of the respective chambers 2 and 3 features an outlet hole 2a and 3a for water drainage. The cathode chamber 2 contains a plastic housing 9 containing a filter 8, which performs a filtering and sterilizing function. An anode 5 and a cathode 6 are installed in the anode chamber 3 and the cathode chamber respectively to apply a DC voltage and thus perform water electrolysis.

A ferrite electrode and a stainless steel electrode are used as the anode 5 and the cathode 6, respectively. As illustrated in Fig. 3, the filter 8 is constructed in such a manner that a silver-added activated carbon 12' and an untreated activated carbon 12" are alternately arranged between upper and lower non-woven fabrics 11' and 11" featuring air-permeability. When forming the filter 8, one side of the non-woven fabrics 11' and 11" is coated with an adhesive, and the adhesive-coated side is fusion-bonded to the activated carbon to fix the activated carbon.

Due to the above adhesive bonding, the fabrics are prevented from blistering. In addition, the mesh of the fabrics is finer than the activated carbon, which thereby is prevented from being released.

The silver-added activated carbon 12', one of the major components of the invention, is made as follows: First, in a one-liter round flask, aqueous solution is made, using 10~20 weight percent of silver salts such as water-soluble silver nitrate ($AgNO_3$) and 80~90 weight percent of distilled water. A dried activated carbon is immersed in the

above solution for 10~20 minutes at room temperature, and thereafter rinsed 3~4 times with distilled water thereby removing excess silver salt, which is not reacted.

At this time, the silver components of the activated carbon are water-soluble and thus easily separated out of the activated carbon, and so the silver components cannot be used for long. Therefore, the silver component must be stabilized through a suitable process. This is, the activated carbon treated with a silver salt is immersed, for 30 minutes, in slightly soluble NaCl solution equivalent to the $AgNO_3$ or $AgCl_2$, which are extracted. Thereafter, it is rinsed 3~4 times with distilled water to remove chlorine from the NaCl solution. The resulting activated carbon is dried in an oven at a temperature of 100~120°C to obtain a silver-added activated carbon.

The above described silver-added activated carbon contains 0.3~0.5% silver and thus the silver is separated out in extremely small quantities. The silver ions carry out a sterilizing function. In this embodiment, silver is selected as a metallic element for performing a sterilizing function. Although gold or copper has the same sterilizing function, they are not preferable in terms of cost or usage. Gold is expensive and lacks practicability. Copper is oxidized in water to form rust, which may do harm to the human body. Thus, silver is suitable for this purpose in terms of the reasonable cost and insofar that it harmless for the human body.

When filtering and sterilizing, the silver-added activated carbon 12' has a resistance in water by means of the filter 8. In order to minimize the resistance, the particle size of the activated carbon is preferred to be in a range of 6~10mesh.

In case where the silver-added activated carbon is manufactured as previously described, the fine pores 13 having an adsorbing ability is somewhat damaged, as shown in Fig. 4. Thus, it has a good sterilizing capacity, but the capacity to adsorb organic materials is degraded, as compared with the non-treated activated carbon.

Therefore, in order to improve the adsorption capacity, a common non-treated activated carbon 12" is used with the same content as the silver-added activated carbon. That is, the non-treated activated carbon 12" is arranged between fabrics 11' and 11", which is treated with an adhesive on one side only, and then fusion-bonded to form the filter 8.

As illustrated in Fig. 5, the above described filter 8 is accommodated in a plastic housing that has a flow passageway 10 on the top and bottom. The housing 9 containing the filter 8 is installed in the cathode chamber 2, to which DC power is applied. Then, (-) ions, which are electrically disassociated, flow toward the ferrite electrode (positive electrode) due to the electric voltage, and (+) ions move towards the stainless steel electrode (negative electrode). Consequently, the anode chamber 3 produces acidic water and the cathode chamber 2 produces alkaline water.

During this process, in cathode 2 a metallic constituent of silver, which is solved out in a tiny amount, sterilizes the remaining bacteria. The activated carbon 12" and the fabrics 11' and 11" filter organic materials, thereby producing a hygienic alkaline water, which is discharged through the outlet hole 2a via the flow passageway 10 of the housing 9.

In the sterilizing process, for example, 5.5g of the silver-added activated carbon was immersed in 50cc of well water contaminated with bacteria, which was contained in a Erlenmeyer flask of 100cc, and held for 24 hours. Thereafter, 1cc of the well water was sampled and cultivated at 37°C using an agar. Thus, the well water, which had contained 1,400 bacteria per 1cc, was completely sterilized.

In the conventional ion water purifier, the number of bacteria was reduced to 100 bacteria per 1cc after 30 minutes of electrolysis. As shown in Fig. 6, however, where the filter 8 of the invention was used, it was sterilized to the extent of 3 bacteria per 1cc.

As described above, according to the present invention, a filter containing silver-added activated carbon and common-type activated carbon is installed in the cathode chamber of an ion water purifier to improve sterilization of bacteria and filtering of organic material, thereby producing high quality alkaline water that is harmless for the human body.

(57) Claims

1. A sterilization and purification filter for an ion water purifier, the filter being manufactured by preparing upper and lower non-woven fabrics 11' and 11" featuring good air-permeability and coated with an adhesive on one side, adsorbing a certain amount of water soluble silver chloride between the non-woven fabrics, alternately loading a silver-added activated carbon 12' and a non-treated activated carbon 12", the silver-added activated carbon 12' being obtained by reacting NaCl or equivalent, and fusion-bonding the resultant non-woven fabrics 11' and 11".